

High Light-Sensing Efficiency Image Sensor Apparatus and Method

Abstract

An image sensor apparatus for converting an incident light into electric signal is disclosed. The apparatus has a color separation layer that comprises a body layer for receiving incident light. A surface of the body layer is covered by a two-dimensional microlens array of lenslets, and the other surface of the body layer is covered by a blazed diffraction grating layer. A zeroth-order reflection layer is disposed behind the color separation layer along the path of the incident light for reflecting away zeroth-order component of the incident light. An image sensor array is disposed further behind the zeroth-order reflection layer along the path of the incident light and comprises a two-dimensional array of light-sensing cells. Each of the light-sensing cells is disposed at a position aligned with a corresponding one of the lenslets in the microlens array and comprises a red, a green and a blue photoelectric sensor for respectively converting energy of photons of the incident light in the red, green and blue color bands into electric signals proportionally representing the energy level of photons in the corresponding color bands.